Edible landscapes

Medial moraine on a glacier within Wrangell-St. Elias National Park and Preserve in Alaska

NPS photo

Glaciers are large masses of ice that persist over time and flow internally. A glacier originates on land and moves downslope under the influence of its own weight and gravity. Snowfall and ice buildup naturally places pressure on a glacier.

If you take a piece of ice and attempt to scratch a rock like granite or basalt, what happens? Will the ice actually succeed in scratching the rock? No.

Rock is harder than ice, so it is the ice that would get scratched. So how do glaciers manage to carve out large tracks of land if ice is softer than the rock it is trying to shape?

There are two processes that glaciers use to do this seemingly impossible task. First, water gets into the cracks and joints of bedrock over which glaciers flow, then freezes. As water freezes, it expands and loosens the rock. Then a glacier can pick up the rocks and carry them away. This is known as glacial plucking.

Second, glaciers can act as sandpaper and chisels in a process called glacial scouring.

Sediment and rock frozen to the bottom and sides of glaciers scour, grind, and scrape the rock surfaces over which they flow, gradually wearing them down and away.

This abrasion of rock against rock can scour the landscape and leave large gouges, small striations, or even a finely polished surface.

In the end, the sediment the glacier uses to abrade the surface may be ground so fine it becomes glacial flour. In some cases chips may be vibrated off leaving chattermarks.

Visit *Views of the National Parks*:
nature.nps.gov/views

Edible landscapes

Grades
5 to 9

Objective
Use common household items to discover ways that landscapes are moved and shaped.

Time
50 minutes

Key terms
» Glacial plucking
» Glacial scouring
» Striations
» Glacial till
» Glacial basin
» U-Shaped valley
» Moraines

Materials
» Chocolate chip ice cream
» Baking sheet (1/group)
» Plastic spoons
» Graham crackers
» Pretzel sticks
» Round candy pieces
» Wax paper
» Paper and pencil/pen
» Construction paper
» Tape or glue
» Markers or crayons
» Piece of blank paper

Engage
Read the background information for this lesson to the class. Next, show the class a picture of a glacial valley that shows evidence of glacial scouring.

Explore
Divide the students into small groups and give each group a baking sheet and a piece of wax paper. Have the students do the following:

1. Label the top of a piece of paper "Diagram" and label the back "Observations".

2. Place 12 graham crackers on the baking sheet. Lay wax paper on top and carefully smash the crackers into crumbs. Remove the wax paper and push the majority of the crumbs to one end.

3. Sprinkle candy pieces in each pan and place pretzel sticks upright into the crumbs.

4. Place a large scoop of ice cream on the mixture.

5. Sketch a diagram of the edible landscape. Next to each of the ingredients, write down an idea for what it represents.

6. Lay the wax paper on the ice cream and compact it by squeezing and pushing down on it.

7. Using the wax paper, pick up the ice cream to observe and record what happened to the ice cream and mixture.

8. Place ice cream back down on the mixture and drag it across the pan.

9. Record what happened to the graham crackers when the ice cream was dragged across the pan.

Explain
1. Ask the class what they think the ice cream represented.

The ice that can be found in a glacier.

2. How did they simulate the pressure exerted on a glacier from its own mass?

Squeezing and pushing down on the ice cream.

3. In the experiment, what do they think the graham crackers represent?

Soil or land disturbed by a glacier that simulate the process of glacial scouring.

4. What did they do in their experiment to represent glacial scouring?

Dragging the ice cream created striations or scratches in the graham cracker crumbs.

5. In the experiment, what do the students think the chocolate chips in the ice cream and candy you sprinkled in the graham crackers represent?

Rocks picked up or moved by a glacier, which are referred to as glacial till.

6. What did the pretzels represent?

The trees and other organic debris that can be picked up and carried by a moving glacier.

Elaborate
To learn about the glacial features of erosion and deposition, guide the class through the "Architect" section within the *Views of the National Parks* glaciers module.

Evaluate
Using the butcher paper, tape or glue, and other art supplies, have the students create 3-D models of a glacier valley. Challenge them to incorporate as many of the glacier terms from this lesson as possible!